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(54) METHOD OF TREATMENT OF TOOTH HARD TISSUES BY LASER  
RADIATION AND DEVICE FOR ITS REALIZATION

(57) Abstract:

FIELD: medical equipment, applicable in stomatology at treatment of caries and dental prosthetics. SUBSTANCE: the method consists in action of laser pulse on the tooth tissue, acoustic pulse arising at interaction of radiation with the tissue is detected, and the type of the tissue to be treated is determined according to the pulse peak amplitude. The device uses a pulsed laser and means for delivery of radiation from the laser to the tooth arranged in succession from the laser to the tooth arranged in succession in the optimal axis; the input of the means of radiation delivery is optically integrated with the laser output, has an acoustic pickup and an electric pulse peak amplitude meter, whose input is electrically coupled to the acoustic pickup output, and the output is electrically coupled to the display unit input; the acoustic pickup is installed in such a manner that the direction of its maximum sensitivity makes up angle  $\alpha$  with the direction of the optical axis at the output of the radiation delivery means, this angle satisfies condition:  $11^\circ < \alpha < 66^\circ$ . EFFECT: reduced danger of laser injury to patient. 6 cl, 5 dwgr

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(51) Int. Cl: A6105/00 A61N5/06

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1. Harem<sup>s</sup> CILIA N 4521194. Kn. A 61 C 5/00. 1986. 2. ABTopcKoe CBHACTCnbCTBO CCCP N 1593669, Kn. A 61 C 5/00, 1990. 3. WO, naTeHT, 89/08432, Kn. A 61 C 5/00, 1989. 4. WO, naTeHT, 90/01907, Kn. A 61 C 5/00, 1989.

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(73) Proprietor: Yue6HO-Hay<sup>L</sup>n o-IIpoH3BOJ;cTBeHHbI2 "Ha3epHbiti ueHTp" MHCTHTyTa To<sup>1</sup>HO2 McXaHHKH H OHTHKH

(54) CIIOCOB OBPABOTKI4 TBEPIjblX TKAHEYI 3YBA JIA3EPHbIM 143JTY<sup>L</sup>IEHI4EM 14 YCTPOLICTBO JIJII5I EpO OCYTi(ECTBJIEHYI5I

(57) Abstract:

I43o6peTenne OTHOCHTCH K Me,HHH4HCKOLI TCXHHKe H MO?KCT 6bITb BCHOHb3OBaHO B CTOMaTOMOPHH npa negeHHH Kapaeca B HpOTe3HpOBaHHH 3y6OB. OCHOBHbIM HeJ;OCTaTKOM 143BCCTHbIX CIIOCO6OB 06pa6OTKH TBepJ;bIX TKAHeH 3y6a na3epHbIM B3nyHeHHem B ycTpouCTB, peanH3yion4Hx 3TH CnoC06I, HBHCTCH BbICOKaSI OHaCHOCTb HaHeCeHHH na3epnoi TpaBMbi nau eHTy. Llenblo H306peTeHHSi HBHeTCH CHHIKeHHe OHaCHOCTH HaHeceHHSi nauieHTy na3epuofl TpaHMBI 3a c<sup>L</sup>TeT o6ecneueHHH B03MO?KHOCTH onpegenem THHa o6pa6amiBaemoi TKAHH. YKa3anHasi Ijenb J;ocTHrae'rcsi -rem, <sup>L</sup>ITO B cnocoe 06pa6oTKH TBCpjbIX TKaiei/I 3y6a na3epHbIM H3nyeHHem, HKnIO<sup>L</sup>taionjeM B031telaeTBHe Ha TKAHH 3y6a na3epHOpo HMnynbCa, perHCTpupyloT aKyCTH<sup>L</sup>TeCKH11 HMIIynbc, B03HiiKaIO114HLI HpH B3aHMOJ;eiICTBH H3ny<sup>L</sup>TeHHSi c TKaIibiO, no HHKOBOLI aMIIeHTy/de KOTOpOpO onpegenHIO T HH o6pa6amiBaemoi TKAHH. YKa3aHHasi ikenb TaK?Ke J(ocTHraeTcH 'rem, <sup>L</sup>ITO ycTpO2CTBO JjnH o6pa6oTKH TBepJ;bIX TKAHei 3y6a na3epHbIM vI3nyenvleM, COCT05II ee 113 noCneJIOBaTenbHO paCnonoKeHHbIX B) Onb OnTH<sup>L</sup>TeCKOii OCH HMriynbCHOpo na3epa H cpej cTba gOCTaBKH LI3ny<sup>L</sup>TeHHSi OT na3epa K 3y6y, BXOJ; KOTOpOpO 01ITH<sup>L</sup>TeCKH conpSui eii c BbIXO) OM na3epa, COgep?KHT aKyCTH<sup>L</sup>TeCKHII npHeMHHK H B3MepHTenb HHKOBON aMIIIIITYgbl 311eKTPII4eCKHX HMHynCOB, BXOJ; KOTOpOpO 3neKTPH<sup>L</sup>TeCKH CONpH?KeH c BbIXOgOM aKyCTH<sup>L</sup>TeCKOpo npHeMHHKa, a BbIXOJj 3neKTPH<sup>L</sup>TeCKH COHPH?KeH co BXOJ(OM yCTpOiiCTBa I/liJ;HKaI1 H/I, npH<sup>L</sup>TeM aKyCTH<sup>L</sup>TeCK111 npHeMHHK yc'paHOBneH TaKBM o6pa3OM, <sup>L</sup>ITO HanpaBneHHe ero MaKCYIMaHbHO2 <sup>L</sup>IyBCTBHTenbHOCTLI COCTaBHeT c HanpaBneHHem OTHHIIecKOI2 ocm Ha BbIXOgC Cpe);CTBa AOCTaBKH H3ny<sup>L</sup>CH45I OT na3epa K 3y6y yrOn a , yJIOBneTBOpHIOI i4I ycnOBHIO: >.i° < d < 86 . 2 c. H 4 3.114-nbl, 5 rm.

**Description [Onncautie H3o6peTeHJst]:**

I/13o6peTeaue OTHOCHTCH K McJ(HIWHCKOii TeXHHKe H MO?KeT 6bITb HCIIOJIB30BanO B cToMaTonopH npH ne<sup>t</sup>leHHH KapHeCa H npOTC3HpOBaHHLI 3y6oB.

<sup>1</sup>/13BeCTeH cnoco6 yjaneHHH xauanbHblx KapHO311b1X UOBpe2KJjeHHil H/HJIIH KaMHeil 3y6a (naTeHT USA 4521194, A 61 C 5/00, npHOпHTeT **22.12.83 r.**), BKnlolalalonglil o6pa6oTKy TBepJ;b1X TKaHCii 3y6a HMnynbCHbIM na3epHbIM 113nyeHHCM. OCHOBHbIM HeX(OCTaTKOM J;aHHOpO cnoco6a **HBIHeTCH** BbICOKaH OnacnocTb HaneCeHHH na3epaoil TpaBMbl npH o6pa6oTKe TBepJ1b1X TKaHeil 3y6a.

Han6onee *6II* 3KHM no TeXHH<sup>t</sup>leCKOII c y IOCTH H npMHHTbIM 3a npOTOTHn **HbHCTCH** cnoco6 neueHHH HeOCnO)KHeHHOpO xapneca (a. c. **CCCP** N 1593669. A 61 C 5/00, npHOпHTeT 14.11.85 r. ony6n. 23.09.90 r. B14 N 35), BKnlouaIOII10 o6pa6oTKy TBCp>ibIX TKaHeil 3y6a **na3epHbIM B37IyehHCM** c JjfhHOLI BOJIIbI **2,94 MKM**. JpiwTeni,HOCTb1O HMnyJ1bCOB **100-500 MKC**, MOIHOCThIO 0,5-1,0 J12K/HMn, IUIOTHOCThIO MOU **POCTH**  $2 \cdot 10^4 + 3 \cdot 10$  BT/CM<sup>2</sup>, uacToToii 1 1'ij, 3KCH03HIMCH 3-30 c. OCHOBHbIM HegOCTaTKOM TIpOTOTHna **HbneTCH** **OnaCHOCTb HaHeCCHHH na3epHOYI** TpaBMbl npH o6pa6oTKe TKaBCIrl 3y6a, CBH3aHHan c oTCyTCTBHCM B npOTOTHnC npolrepbbl **Onpej;eneHcI** THna o6pa6aTBIaeMOYI TKaHH.

I/I3neeTHo yCTpONCTBO J;nH O6pa6oTKH TBC) blx TKaHCil 3y6a na3epHbIM n3nye1n4eM (naTeHT WO 89/08432, A 61 C 5/00, npHOпHTCT 10.03.89 r.), BKno<sup>g</sup>alonkee nocneJ(ouaTenbno pacnono}KeHHble BJIOHb OUTH<sup>t</sup>leCKO\$ OCH HM11ynbCHbl\$ na3ep H cpeJICTBO ,HOCTaBKH 143ny<sup>t</sup>ICHHH K 3y6y B BHJe OITH<sup>L</sup>leCKOpO BOJIOKHa. OCHOBHbIM HCJIOCTaTKOM **JjaHHOpO yCTpOLICTBa HbHHeTCH** BbICOKaR onacnoc'rb **HaHCCeHHH na3epHOYI** TpaBMbl npH o6pa6oTKe TBep.gbIX TKaHeil 3y6a.

Han6onee 6JII3KHM no **TeXHHUeCKoii CyUIHOCTH H npHHHTbIM** 3a **IIpOTOTHII Bb\$ICTCH** yCTpOLICTBO gym o6pa6oTKH TBepJ1b1X TKaHeii 3y6a na3epHbIM **H37IyehHHeM** (na'renT WO 90/01907. A 61 C 5/00, npWOпHTeT 25.08.89 r.), cogexratnee IIocneJcOHaTej1bHo pacnono}KeHHbie BJJonb onTHUecxoit Och **HMfynbCHbli2** na3ep H cpeJ1cTBO JjOCTaBKH H3nyehHB K 3y6y, BKnlouaIcu ee OTpe3oK OHTH<sup>L</sup>leCKOpO **BOHOKHa, BXOJj KOTOOpO** OBTvi ieCKH cOnpH?KeH c BbixonOM na3epa, vi **HaKOHCLIHKK, BXOJI KOTOOpO onTHUeCKH conp2Kelt** c **BbIXO**) OM OHTHUCCKOpO BOJIOKHa, a **BbIXOJ( HbHHeTCH** BbixonOM ycTpovlcTba. **OCHonnbIM HC) OCTaTKOM** npOTOTHna **HbHCTCH** onacHocTb **HaHeCeHHH** na3epHo i TpaBMbl npn o6pa6oTKe TKaneLi 3y6a, CBH3aHHan c oTCyTCTBHeM B npOTOTHne CHCTeMbl onpegeneHHH T1/IHa o6pa6aminaeioi TKaHH.

3aJjaueii, Ha pemeHHe KoTopoia Hanpanneo 3annnHeMoe H3O6peTeHne, HbneTcH CHvoKeHVte onaciiocTB HaHeceHnn nai vleuTy na3epHoii TpaBMbi 3a cueT o6ecneueHHH BO3MO?KHOCTh onpej;enein5 THna o6pa6aTbIaeMoii TKaHH.

YKa3aviHas 3a) aua j ocTnraeTcn TeM, wTo B cnoco6e o6pa6oTKH TBep) bIX TKaHeil 3y6a na3epHbIM **H3J1yehHHeM**, BKJHoualou;eM BO3) eiiCTBHe Ha TKaHH 3y6a na3CpHOpo HMnynbCa, perucTpvipioT aKyCTHUCCKHii HMnynbC, BO3HHKalonjLn\$ npH B3anmoneilcTBHH H3ny<sup>t</sup>leHHH c TKaHbIO, no nuKo8o1i aMIUIHTy) a KoTopopo onpegem noT THn o6pa6aTbIaeMOLI TKaHH. **AnH HOBBImCHHH J;OCTOBepHOCTH OnpeJleneHHH THna o6pa6aTbIaeMOil TKaHH yKa3aIHb1il** aKycTH<sup>t</sup>leCKHII HMIIynbC perHCTpHpy1OT B J;Hana30He **3ByKOBbIX** <sup>t</sup>iaCTOT 85-95 kl'g. C TOLL ?KC U,embIO o) **HOBpeMeHHO** c **perHCTpaII,Heii** aKyCTHyeCKOpO HMIIyYIbCa **H3MCpHIOT** BpCMCHHyIO 3agepnKKy Me?Kpy na3epHbIM H aKyCTH<sup>t</sup>leCKHM HMIIynbcaMH, nO **BenHUHe** KOTOPlI yTO<sup>t</sup>nIHJoT THn o6pa6aTbIaeMOil TKaHH.

YKa3aHHa5 3aJ;aua TaK?Ke JjOCTHraeTen TCM, *4TO* ycTpouicTBO J>nH o6pa6oTKH TBep);bIX TKaHeii 3y6a na3epHbIM n3J1yerneM, cocTo5In ee H3 HOCHeJ(OBaTeJ1bHO pacnono?KeHHb1X BJ;Onb OHTHUeCKOii OCH HM11ynbCHOpO na3epa H Cpeg;CTBa J1OCTaBKH H311y<sup>t</sup>leHH51 OT na3epa K 3y6y, BXOJj KOTOPOIO OHTHUeCKH ConpH?KCH c BbIXOgOM na3epa, COJ;ep?KHT aKyCTH<sup>t</sup>leCKHII **npHeMHHK** H H3MepLTEJ1b nIKOBOil aMnnHTyJ(bi 3nCKTph<sup>t</sup>leCKYIX HMIIynbCOB, BXOJj KOTOPOpo oneKTpyneCKAi conpH?KeH *co* **BXOJ;OM yCTpOLICTBa HHJIIHKaUHH**, npHyeM aKycTnueCKHi4 nplleMHHK ycTaHOBneH TaKHM O6pa3OM, <sup>t</sup>ITO **HanpaBneHHe** ero

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 30113ahIJ,UO 331I0IIEhOlu5le 'Edaf£EU NIOfotxlg a Haxcuduo3 HxaahFJ,uo o.Iodo3Ax t'OXF 'Z d9/c£  
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 I4tf/LLHUINI31 H0130x11u 4uaJ,ndaNi£H o<sup>98</sup> > p > OTT ornaoua& biutnoil3doaa.aaotLC P 110J1C  
 d94C£ 31 Edaf£31u J.o unHah1CU£H 11xe31Jaot1 Eejatfada atfoxige nu moo HoxaahHJ,Uo  
 N13H11auaEdJIEH a J,3KU1131L303 HJ,oOH4u3.L14HJ,3EISH LIOH41f31'1113MEN1 OJ3 3HHa116EduEH  
 OJ,h 'N10£Edgo NIHx31J, 11U<sup>£</sup>HH3IaOHEJ,o1C 'g 3 UHN 3IIdu v11xaahH L3 cM31 'j7 MHHh3HOMEH  
 11 0131011011 a0313ahL1J,u0 331U0I31hOIU31e '31daf£31u NIO11OXH11 a Haxcisduoa H3133h11J,110  
 o iodo.Lox lfoxa 'g IC9/C£ x 31daf£311 ,Lo 1SUHahiCu£14 o.IOHdaf£EU 113113E.10011 'off Latlada 'j daf£Eu  
 14HE£313lou ad1Lngl EH 'g'JR( EH EHa1HEJatiadU ouodo.Lox 311'133C3 'naa,aHodJ,aiC oninoNou  
 a 'daNiadunn 'Huao£1111lead 4J,I4g J.axcow icnHaJ.ad9O£H I<sup>£</sup>ufNdo4) ru on 9030113 HlgHHaI(QISEC

owdaJ,ndx J,audio L311HOtfA aaHa11lad 303133hH1X3J, 0111E3 E 1£OH0H ISa.L HLmIS  
 HoxnH£Hdu K11H3J,ad90£H au1CN[do4 H XIquu3xcoU£Li q.1,aoHUICM080a 'aodoj.an PI Suliatfaea Oj

'11H31nJ, )JONianaIssue9Ed90 EU11J, 1.114H311ho.LA gJ.30HMMON1£oe J,31SUHE1a011bdu  
 Eo34u1C111'114 X11313ahnioAnE xaxcdatfn£ Xi4HIlawada anHadaNi£H '1'1o£Ed90 1HxnJ,  
 (1) 111131116 H11H311L d£Ed nth' Llu1p01EMIH£oH '34IfA1NIH HHxa3hHJ,3AME 1'13h 'Ea4u/CIINi11  
 OJOHdaf£EU EI1EhEH oH<sup>q</sup>u3J,H3oHJ o dx3cd3tt3£ ouCIU4naw swarm nuHalmideud  
 11du I3H11IOIEIHH£Oe 'o<sup>q</sup>udlu'TU 911313ah11J 31(313 OJ,h '01&11£1 .I'Hg'.I114 CH '31HLJ,113H  
 H 111131116 n'nna mend Ni3J0dOU a1111ou£axa.LaaJAOa '11HJd3He 11J,00HJ,0111I 11Heodd r9HE£EnOu  
 NIOdn,LmniCH 9z%n'uj EH '(I) nUEL12e 11 (a) EH11J,Hatf 1111Ham/Cd£nd Nth' x 411101nxuH£oa  
 'E03°a ICINi XH3133h11J31CME '(9) 'iiooHxdaeou olbbNi3EHlgJ,E931d90 EH o.Iah 01'EhEU 'ISHHahAlf£u  
 0.I011d3£EU 11L.Id3He LLL3o1JA1.0 (E) Ea4ulcuNIU o.loHdaf£EU IJOHHeuOH3LHU I4NaiEdjnn1  
 3I41HaiK3de 3111U0I1SH3K0u lauauaEJatfadu g,•.I114 EH '(HH31MJ, 150113E1I'LLE9Ed90 NIOUHx -a's.)  
 1saH3m d£Ed as Euodou IIOH11hul13u 11 IH31)J, Io13naI<sup>£</sup>.LEgnd90 aJ,aoHXdaaOU EH KFHahAu£H  
 OJOHd3£L'U ol4.LaoHH11o11aLH11 'a'IUe(IINIU 1 11313ah1Ja2Cx31 oaalnoIAdudJaHaad 'E3IHN1and11  
 oJOx3an1J,aICxn Otl '11HE3J, £.LaOHxdaaou IS31NI331ha1190 ISa1,31SUHls NII4do.Lox '31L 1£  
 Ex1HhOJa14 J,O Na11HISOJ3331d :PIKEdO.LxEcl) ISNlad.L KaJ,agu3tfaduO uxxcdall1£ Ho.Le EH11hIu3\$  
 •11HEx,L Kahalmcd£Ed 3UL'hEH o O.IaluOL aLZ 4Ifa.Lat(Hea 'E341MUNIH OJ03133hICLDA3 E  
 Na11HaifHK011 ,11 Ea4u/tl11U O.loHdaf£EU ISMH3lp ff£Oe IKOIIEh31H afxcaPI Exxcdal(E£ KEHH3Nt3d1  
 IS3.LDE1101U9EH a31h~Crto 11a1I190 a '3I113hEH£ ISaH3HIAd£Ed x11 KUif 30Ni1111OX90aH J,anmI4eadu  
 o.IODO.LO3'madam 'ISLIHahICIEI OJOHd3£EU OU0H3411/C111^I11 3191(£ 11I1ExJ, EH 11Ha,I3 3tf£OH wJ

'11HE31. II10113EHI4,LEgndg0 E1111X  
 KMHauatfaduo 4Ja0Hdae0Jaotf 4JSIaIgaOu <sup>q</sup>.LoomKONicoa J,a31lf a034U/CIINiH XL313ah11J.3kle  
 avtaxau'aa ISEHg11Ed.Ln3no 'IIO£Ed90 murex tux 56-58 .LO.L3Eh xI<sup>£</sup>aoxAa£ 33011011  
 s OIIH3111 OH411ENIH33ELY IS11HaIII0HJ o 3LH3h31H£ o.Lh '0Ht111a EMHiCa11d cmj '11U311te 11 3H11.LHat1  
 H xl4Nialcdudaua.I 'ao34u<sup>£</sup>nwx XLI3130h11Ja/C31E eodL,xau3 tf&L111nrn3 K11Ha1II0H.L0 xu4EdJ  
 1433CEdgo£11 111'.1114 EH Aida 56-58 .LO.L3Eh xI<sup>£</sup>eoxdef a3ouou a ISaJ a3tfO[119EH 'EHH,LII f  
 11 111131116 IIHaul/Cd£Ed udu XIallOIE3111H£OH 'HOa411CID'UfX113133h11J.32CBE IfLLHIFU1iE xi4H03114u  
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'1LLH3L111EU KII^IHEdL 140Hd3£EU 111111333HEH  
 ISExa/Cu0tf an 'KLH3hAU£H OIU.IdaH6 11.L3OWIifoX9oaH aEhAifa s 4J,3131c11H3 4Jaounco11£Oe  
 .1331 t 'LUI31xJ Ho<sup>P</sup>Ianal<sup>c</sup>u.Egndgo um, stm. atfaduo olxcoll o.IODO.,ox a1LLLLFIn i<sup>£</sup> 110110x1111  
 Ou 'oI<sup>£</sup>H<sup>£</sup>3J, 3 K11H3hA11£11 1111aL3 pt(OIi11E£e nth' O.I3tttOIEx11H£OH 'E34mt11N111 oJo3133hILL . ME  
 11Lt1EdLaLJad ulll13dauo 31gA£ MaHExJ, 11MJ,09Edg0 9030113 s 311H3tt3aa 'Nto£Edgo

4daoHxd3aou oIAN13EH14d,E9Ed90 EH .LO[ISicuEdIIEH 314113hitlf<sub>g</sub>H 3oHd3<sub>g</sub>EU 3OHa4UIt111VH  
'EH14S,H3tl 14 H11ENIe 14HHamdd<sub>g</sub>Ed mdxllluotux14H<sub>g</sub>OH 'Etoo<sup>q</sup>ut11NI14 xxxaahlldattxa 1tLdLIUUN13  
xIgHquudd,x3ua x14aoxnu m xaxcdallE<sub>g</sub> °111t,LHUUNIE x14aoguu HHH3haH<sub>g</sub> ai4HHOICE.Le  
E4Hah/tUOU xEx o Iod 3lfOOII °HIfeINe *Mitt* XI4IIHOIra Le aH.LOahE *I* H .LOI1tdI73)aI 'HICEINic  
*I* Hamltdd<sub>g</sub>Ed mdx ouatuorexMucoa 'Ea<sup>q</sup>uXurtm 0.I03133hM, abrE I4tltiLHlmNiE (3Ho<sub>g</sub>EUEEHtt  
NIOHHE<sub>g</sub>E31 t a) HOH<sup>g</sup>UEdd,xaua 140140511411 H Hxxtdatec 'I411Aa,IlInu<sup>A</sup>IE HOHOiHU ISHHahrHc  
**UXI56** Olt **98** .LO .LOS.oah 33ouOU H Ea411itIU'414 0.I0x33na LoltxL' Ed,Lxauo AitiI 14ICIBYE  
otdaoxau .Lotuclaw<sub>g</sub>H H EO4u/tuwn O.IOMOahH.LO/txE (3HHEaO<sub>g</sub>Ed9o3du-agdAtcp 'dalvadiaH)  
3HHEa0<sub>g</sub>Ed9oadu aon<sup>c</sup> radxxauo d,HtloacaodJ •Ea4uAAIU<sup>A</sup>IH o.IoHda<sub>g</sub>Ei EIfehEH oH4uad,Ha0H,Lo  
Ea41161u~IH o.I03133haLo <sup>3E</sup> EIfehEH lt1131cdaYIE<sub>g</sub> .Loral ildltadup •ao<sup>q</sup>ultuNU4 o.E03133hada4cME  
ALCEhEH LIHIHOI1tHS.O,L2HJA00 'HHa<sup>P</sup>lada .LHMOIAI ,LoudazMH4 H 'e3auguilH 0.IOMoaha.I oA3Ia  
**AllLmul n** outaoxau doladaNN<sub>g</sub>I/I °iioxawaudu NIHXO3hH.Lo&3I i4HO<sub>g</sub> 1.I0NI3Eht1190 H<sub>g</sub>I411ga  
I414HHa)aououood .LOI/tdad.LOH.Iad 3<sup>c</sup>utifi pNH 14H)IO3ha.L3tt31a .I.O.Le •34u1tu is 1/I14M3ahH.L3tt311  
.Laaxaa<sub>g</sub>oa Hu rw nau3m td<sub>g</sub>Ed adf j •ttuahaH 0.13 aaluoL aLO•L3H.LOOa 'auawada .LH31IOYsl  
,LOLtdmoxH4 H O4uttu is HIgada<sub>g</sub>EU .Lo Adad.Loajad NIH.Le 3 ouxal<sup>A</sup>Iadaoalp •I4ifmmle Eli<sub>g</sub>Ed<sub>9o</sub>  
o.Iol hoaadgaICEx 4.LOoaxdaaou *of*taBa<sup>o</sup>%Lu ed90 EH d,otuaaeduau 14xa1daoll oaa,allada  
<sub>g</sub>3dan 'IVoda<sub>g</sub>Eu Nu4H34ukmrn 3oJ 1aMadaHa,l '3HHahAu<sub>g</sub>H 0.IO.Le aI3OII °EHII LH3lt HUtf  
xIcHHO1m.Le aad33he31 a <sup>L</sup> 11HIIEMHIIH4 3H,lal?odd,ag a d,otXda3xa41 °EHH Lu *I* HaJamAd<sub>g</sub>Ed  
mdx o.I31noraxa11<sub>g</sub>Oa 'Eag1 im a o.103133huLLo c) E I4lit(u,arn QE (3HO<sub>g</sub>EUEEHlt u' oui•E<sub>g</sub>EaX  
a) 110H<sup>g</sup>UEdd,313u3 HOHO311411 H HxxCdaltE<sub>g</sub> 'I4lttLHUUNIE 140HOx14U H14H3hEHC •TJ31 **96 olt**  
**88** .Lo .LO.L3Eh 3aouoa a Eo41Ltu1<sup>A</sup>Ii oaoxa3h14,La[txE Ed.Lxauz Aicd,umir a oIttuOMHU d,olidaiY<sub>g</sub>I4  
H Ea411faly a oJOxoahadaXxa (3HHaao<sub>g</sub>Ed9oadu-34dtt0 'dayinduBli) 3aHEHO<sub>g</sub>Ed9o3du  
3o14UEdd,x3U3 .LHtloa<sub>g</sub>Hodu **8** HHYIEd,L4I a4I 14 amiaao<sub>g</sub>Ed9o3du o.Ion4ICEd.LxauO 3x0119 \$  
•E34Ir u **NH** O.IoHda<sub>g</sub>EU EIfEhaH OH4u3,LHaOH.LO E3<sup>g</sup>1rAIm14 0.I05133hadatcME arfehaII Xxaadalta<sub>g</sub>  
.LoiHUaltaduo H0UeadaLH14 XI4HH3113da HnH3d3Ni<sub>g</sub>H 3310119 g •Ea4UttuN1a o.I05133ha.LOANE  
AuehaH aatuolttadadaad,000 'Hu 13d& .LHa1NOiv LotAdaax144 H aogifttuNai O.IOx33h14d a/t is  
ALGLHuuNIE oittaoxan d oaHdaNi<sub>g</sub>a *9* i'i t&LHICUNIE v\_tOHOauu NI3113d,adaNI<sub>g</sub>I/I NI0aaHNI3adH  
NI113133hHd *3ICIM* I'HO<sub>g</sub> 11ONIaEh/tI90 14<sub>g</sub>1411914 NII<sup>g</sup>HH331O11O113Ed dA1tdad.Londad a411&&IINI  
11Hx33hada1txe d.O,Le •34uAINEH H1431zahHd3AA31E daarHH<sub>g</sub>oa EHH,LH3tl HHH3mAd<sub>g</sub>Ed adLI  
ItL[EhEH 0.13 I!HIIIIOGtadadaaLoo3 '11113NI3da d,H3INON1 d,oIAda3aa4 *6* HOUeadad,HH XIcHH3NI3da  
HH13dbwt<sub>g</sub>H 3310119 *of* H 34u~im'u v\_Hcada<sub>g</sub>EU d orAdaddaa.Iad pj Wodod,EddaH.13dodA4  
**ILLS** 3 OHHa<sup>P</sup>13da0Hlip •EHH.LHatt En<sub>g</sub>Ed90 0.I011oaOd9HUEx 4daouxdaaou  
01EYMaI4d.E9'ed90 EH dAIHifaeduaH *g* MHHh3HOMEH H <sup>E</sup> OH3OUGH 3Ox33hId.UO 301110IEhOIU3la  
?, Hxaad.3ott oad31tad3 <sub>g</sub>ad3h 'Nloda<sub>g</sub>Eu NI14H34u4tuwa aoiiaetdadaHaJ '3HH3hiAU<sub>g</sub>H  
oaoxe 3830[ 'Huewe HHHam[td<sub>g</sub>Ed Llodou 3atuolltad.ad and oo3 'a14H3h1H<sub>g</sub> aaluoIEml4Hadu  
'j Eda<sub>g</sub>Eu HHhEdaH3.I HH.lId3ne 41t3aodit d,o18auuaauadait oaod,e <sup>g</sup>ulf -um,ollodd.olf  
Ed,xEdd, o.Ion<sup>q</sup>uJ,LHdaji<sub>g</sub>a /txaod9Hriex xultoaodu NQaulHahutu<sub>g</sub>H NI4Hda<sub>g</sub>EU e9A<sub>g</sub>  
gauaxd,xlgltadaad, Hxd o9Ed90 NIOI1EhEH t13d3l •a9030u3 HHTia<sub>g</sub>HIread 14oud,adxHox danadU

'HHüExHüHH

eadavlodda t NNOttoxa **OD** H33FuHduo3 Hx33hadd xaue tllox14H a 'EMH11mH3adu 0.I03133ha LoAME  
NtottOXI4a 3 H3 Ifduo3 lax33had LM3ue o.Iodo.Lox ttoxa IIodod a 'uoueada.LHH xi4HH3NI3da  
HHUadaPt<sub>g</sub>H exou9 uotloxa <sub>g</sub>H Naatio 3 HaxuHduo3 Hxzahad,Lxaue tllox14a a 'Eda<sub>g</sub>EI1  
31011ox14a 3 H35CHdu03 a 3had,uo edod.Eddaa.13dod,O4 ttoxa NI3hIdu 'ol do.LEddau iadod.o4  
*6* aouBadad,HH xI4HHaPI3da Haa3daiN<sub>g</sub>H x0119 ax{MEJ, E 'L HHIIExattHH as Lojod Lo  
INOttoXa 03 H 3 / HdII03 Hx33hadd x3us ttOXI4a E 'EMHHNt311du o.I0313ahadattxE *31011* oXI4a  
a HaHwduoa Hxaahadd xaus ouodod ox t oxa *9* fiO34If(tmNH xM1OahId.Lxaue I4ttA LH11nNtw  
goaoxuU 4ua.LHdap1<sub>g</sub>H **o99 p > eTT** :oiaaoua[t usiluoindoaI uaott& *uo.LA* 69A<sub>g</sub>  
Eda<sub>g</sub>E11 .1.o HHHah1AU<sub>g</sub>H Hxaadaoti Eadattado atiox11a um moo 150xa3nH.L110 NI3HH311'UEdIIHH  
a .1anuaad003 Hd30H<sup>g</sup>IYaLaadaa1th YIOH9IIE NIH3MENI 0.13 aHHauHEduEH 0.Lh 'INO<sub>g</sub>Ed90 NIHSIEJ,  
Iy414HHOUaOHEd34t 'g xmlu<sup>A</sup>I3Hdu UHx3ahHda/txe *I;#* MH1u13HOHEH H g OHXOUO1 30333hLd,UO  
aatuOleh0111xa 'ed3<sub>g</sub>Eu Ntoltoxiga a HaMCHduo3 Hx3ahMd,uo o.lodo .ox ttoxa 'z S91i<sub>g</sub>x Eda<sub>g</sub>Eu  
a,o HHaanAu<sub>g</sub>H odoHd3<sub>g</sub>EI Hxaadaott 0adatiada 'j da<sub>g</sub>EU I<sup>g</sup>HE<sub>g</sub>EHEHou adLiup EII °g',I14~  
an au3uaa Lotiadu ouodod ox ENTaxa 'EHdaHoddatt ol4tuoutou 3 daNtaduan '11Eaocmue3d 4d,I4g  
.La noNI HHHa. adgo<sub>g</sub>H 14u~tNIdo~ <sub>g</sub>u ou 9o3ou3 1RI4NtaB11aIE<sup>L</sup> HHtrexntiaa EHdaHoddatt  
Nlotfoxa Oa H33E{Hduo3 Hxaanlldd xaue tioxi4H a **ti,Ix 86-98** HHHa l3tCiiodu LiOaouou 3  
**8** Ha11add,4ua4I H HHUeao<sub>g</sub>Ed9oadu OJOH4ued,Lx3n3 xou9 <sub>g</sub>adah ExaHNiaadu o.IOx3ahHdattxe

soma EHOƒEuENtf o.iowaunaadu EYINHEd.I<sup>−G</sup> IsKHxdag .I.aEini4aadu aH on-mod& ItLQOHHEll Ou IgHUOa NOHdEY(d N,LOOHHauaEduEH 14NU'cEd.IENtf igHNdlunAuou aaHahiHƒ HN.LHatf N mime EH KNH.L3NatƒOa o.IondaƒEu aoNlax{ad xL'd,LawEduu xi4HhrnƒEd Ndu aodaƒEU xI4HaquCuNIN E.Ltdx o oxodx i **nut**( •I4112CLNUUNia goaqueJINaME1''I **Oj** oiHaodA ou i411UOa NOxaahN LD~t]IE NOHdul:tA N.LoOHHauaEdUEH IgHINIEd.IENIt EHNdwu <sup>g</sup>uou EHauUGHE.La2t OH'IUE.LHamdauOxe NN[Edo.1.aV -v\_ioxoahMdarl)a x E3Iƒ14119 EHIOH KEx3 hN.Lalt E ISEHƒaIOj '(130 i OM3 hM.LUO 011 'a•.L) 15NH3h[tuƒN O.IOHdaƒEU iSNHaHEd.Laoduaed OINHauaadueH PIOH%OIIOUGHN.LOdu 'NNHaueduBH a au.ld NIOHaaua.L noxcA a Kax anad.l.aodu3Ed N LTOH113uaEduEH IS3.Laauaa EHUOa KEHdaI(c•NHEx.L NNHamAdƒEd Ndu <sup>u</sup>3YII0IMIIIHCOEI '**WHIMS** |, O3133hII.L3Itxa 3 OINH3HHEdo Ou N.L30HH39030 .L33rIN EHIOH KEHdn (**A** O3E14t0 '11OH51CoJTƒOH3H Nxaahn.Lxadu ornad.Lavmad o.Ia Ksualt 'Ea4UltuNiN O.IOxaahN.LDAIIE O.IOHƒ3110U AIISLNUUITe (cud **Oj** a oudaviadu) cud oJOHN1 oa .LanIIII4aadu n HHExx NONIanaI4.LE9Ed90 **minx J,o** .LNozaaƒ 311 '11H.Loah i zodaNƒEd n oi4.Laodoxa KaLauuah'aduo ImIIUOa aondeh'IC E1 **ALNUIIN V** 'EHUOS ISExoaha.Lattxa KenduliA .Laaxr coo Alah 3.LE.L<sup>q</sup>u4tƒad a '014.Laodoxa L\_Toaox/taƒxdaaa oo axA1ƒOa a uai.oi<sup>g</sup>nad.Laoduoad I471N.Loah ILLS '*IMMIX* 01HH3hX11CII AaoHdaƒEU Ahad.Louau .LiSa0HI4a NIaNHauaatt NINxoaiga **troll** I4ƒE.I 3I4.L3d.IoƒEd •3NH3dauau n aaHamAdƒEd aoHha.LOEh **xN** .LNi'Oxooad[j •dA.LEdaum.L xaxoalga Oh' KaLOiEaad.IoƒEd E9dƒ NHEn.L **oi**<sup>g</sup>lidaa.L amiAiaaai'L.LE9Edgo EagUltuWN o.loadaƒEU NlaIH.Laigatf tf0[j

'ivahuxialaua a xyloxaoa E1lodadu x[/[ •NHEn.L '13auom tdƒEd o onHaH.LoSladaouaH 314IanEƒKa3 on 'I4aquAi m 3113133hll.LOAAAME .LOIEnaHEOH 'OxaHtfO **IMMIX** ax.Lo9ad90 adjj •NOa'uAINN Nli4HdaƒEU NHEM.L NNHamAdƒEd Ndu o111110IExrHƒOa '14aglsfunm oa3133hz.L3ACxa <sup>q</sup>waaodad.I.ozjad ONIN1(Ox903H NHEa.L **II**oi oaaIV.LEgadgo oua.L 0 <sup>lll</sup>NIENIdo4 HN KNHah/ 11011 Kut(

'NHEM.L aONouals E9Ed90 auN.L 0 LlaN11ENIdO~HN a NNa.L3•L3H.L003 H EdocaU 121111Ed3nal NoN.IdoHc ISNHauHEdIIA oz4.LooHwONiƒOa Ka.L3EHNh3UO39O NIONHah/AUƒN Nu4HdaƒEU Eg.gƒ NOHEM.L xi'lfdaa.L 1/1a.1,0gad90 IgdAlallodu 4.L3OHaiIIOƒ3g 'HN.LHo 1 MEx oBh/tua NIOHHN.LOdu **S** 'g1IBNIe aEx .I.OIISualtaduo EgAƒ YHExa. oiA 1doai. oanaeaI4.LEgad90 o.L 'OHHaU.LaL3a.L00a EHN LHatt N NIfENIe NHH31ILtdƒEd NIOHdaƒEu Ndu xahioi xNHƒOH 'aoo u tIIYIN xaxaaha.LoAxa xaxtdatfeƒ KNHahaHƒ oi4HHO11B.Le 111 <sup>'61</sup> 3tf.I /('r1 + <sup>1</sup>) < 1 :olnaouoA .LaKdoa l airH0li/C <sup>1</sup> EaquAUNIN o.loadaƒEU oH<sup>q</sup>ua.LNaoiLLA Ea4[[AlnaN 0.I03133ha.Lalt3IE Exxadatfaƒ HEHHadaP!ƒN 11I1a3 'oahAIIa NIO.L \$ 'EHN.LH31 ' N H UENie xaxcdalfaƒ NNIKNHahEHƒ NNII4HHOI1E.Le 3 33 .LAIEaNHHEd9•HHEM.L NNHautdƒEd **nth**" o.131110IEnuHEOH "ea<sup>q</sup>**uAI1H** o.loxaahn.LOAxe NiOUEhaH N EaeuAuKN o loHdaƒEII NIOIIEhaH Allman 1C.Inedaltec .LOIHdONIƒN 'EUahaH 0.13 wiioi ON1 .LOIAdaaxxc N o4uiiNr viqudacaU .LoLCdad.Lau.1ad Edoved.LoZ.Iado.Lo4 oi\$HON on o E91tƒ NHEa.L VOP1oaa14.LEgadgo Eua L IcauoHhO.Ltt KUtj

•HN.LHatf xux - aahAua N1oHHNxodu a '4uaN1e aEx .LOIKuattaduo Egdƒ 4HEx.L otAldaa.L oLANiaeaI4.LE9Ed90 oa. 'oHHaH.LaLaa.LOOa EHN.LHatf N Hume NNHaIUAdƒEd nondaƒEU Ndu xNluoiaxnrƒoa 'HOaqu/tuNIN xaxaahH.L3A Ed.Lxaua I tft.LNUIUP l<sup>q</sup>oaoxau ISNHahaHƒ oKUnHOUB.Le- <sup>U</sup>**S** <sup>i6</sup>**g** atf.I '?,/a**S**+6**S**)>**S** :ouia0113A .1.aisdoa.Lauaot(A **g** )I,jx <sub>26</sub> **Olt gg** .L0 .LO.LoEh 3o0uou H ao irAuNIN O.IOxoahN.LOAxE Edxxaua ullAJ-NUUNre uvaoxau ISEHHadaNiƒN Nuaa 'aahltl D 110.L \$ ''eHN.LHatf N NIIENTe Kull Ed.Lxauo tfLi,nums a xi<sup>g</sup>aooxxw NI1KNHahaHƒ 11P119HHOUE.Le **3** 33.1,01WaHaad) 'li,jx **26 011 QS** .1,0 .LO.Laeh aamion a Ea<sup>q</sup>**uSu** i 0.103133hN.LoAxa Edxxauo I41fLLNuNNre 311113hxHE (3oH4II8NIN33MI) ooaoauin .1.0I1fd3p1EN N Eo **IrA w1H** 0.I031o3ha.LoAaa oNHEHOƒEdgoadu eon4UEd.Lxaua xisdoƒNodu mum. I<sup>q</sup>ONiaEHl4LE9Edg0 Ena.L 1SNHouid ioduo N.LOOHdaaO.L301f Ki'IH3MIgUOU Kut(

'ni LHalf xux auhkia Niofax.Lodi a '4UENIe xux .Loxauattaduo E9tte **um's. oiA** tdoaz. oLtNlaaaI4.LE9Ed90 oL 'oHHaa.LaLaa.L000 EHN.LHatf N NUENE NNHaNLtdƒEd rioxdaƒEu Ndu xaniO1ExNHEOa 'aoa <sup>q</sup>u/Cium xxxaaha.LoAae lettAs unn' a ijoaoaaU KNHanaHƒ aIGHHOUE.L<sup>g</sup> **vd** <sup>'6</sup>**v** attl 'z,/(t(y+'d)>**V** :oINHOUa& ..andoa .auaol1A <sub>4</sub> Ea<sup>q</sup>uAluua o.loxooha.ia.CHE uh'LI,Num a issaoxIU isauuadaulƒN 111133 'OehlAII3 N10.L •EHN.LHatf N NIENIe Kutt tiI~LNUUNre xu4HOaxu NNIKNHahBHƒ NNII naoue.Le **3 03** .LOIEaRHHEdo N Ea4UAirIN o.IOxaahw.LoAaE o.IOHHEli AI/tLNUUNIE oLtaoaaU 3,011fdoNiƒj/j •NIoxH3h411ƒN N1I4HdaƒEU E9Aƒ NHEa.L giotfdaa.L NNHomAdƒEd Ndu \$INlncrexNHƒOH 'aqurAn is NNxaaha.Lo/txE .I.OLCdadl.aa tad •Eg/Cƒ NHEM.L Uolidaax



'IrEH.Im3 vllrtx3ahNd.Lxaue a xaLattcEdgoadn °rvoxmHVvamdu IHmM3 hm LOtjJE o.Iovva1dlad.LJI1Jad  
'E34UAUVVm 0.IO313ah11J3/CNE i^IOLIEhEH m °rvodosuedJam,lado.LOI) oJorlaAdmd.LJLI,Iad 'E34u[Cm m  
oJOHdacElr nOUEhEH IClixcara Exxcdalfuc aoireada.LHm xi°HHaraada aua.Ladaa4wa atfoxr a  
11FI °g ExmHNlamdu 0.IO3133hLI.Labre N1o1 OXI4a 3 HaWWISduO3 Y13133hwd.Lx3ue aOUEada.Lllm  
xIgfHarvada Kua.LadaNEa 1foxa vlOdo Lg °91-60 Etrnd.IODUml3o o,loaod4 a i 3009 EH  
6 aOUEadas,Hm xI4HHanada aua.Lmdarzem aoltoxa em nuullo 3 Iu°amaxclsduoa mxaahvld.Lxaue  
m j 11daeBU' Piolfoxtga 3 Nf°uIHaxczdu03 Id3133hH.LUO 'Kr((D 11t0m11'OJ04) acEg EH 01  
dos,Bdaam.Iadotor)I a,umcdatto3 on4Ira.LVIHUOuoh oaLo od,L3A ax[x11y °9 Edo.Lxa.Lat1 oaoaoxuu  
Ntolioxa 03 HaxcISduo3 ux3ahad.Lxaue 11Oxi4a u 'g ExrnNamdu o lox3ahLI.L3ttxE IYoltoxi a  
3 H33KISduo3 1113133haldLB3Ue 1foxa o.Ia o.Lh 'NIOEEdgo NIL13ML LII4H131E0H11J31C '988 'j°.LNI  
Edo33aYIodu 30119 11H jzgnii aocalread 11 a4dA(p ala Iraocudgoadu aod.L3I4g amtnoLCe°uou3u  
'g E03gLa11111 xux33hvld.Lxaue mmt ud.,°um u auxuaocEdgoadu o.Ion4IIEd.L31au3  
mom) .Lmicdatfo3 OaJarlodJad oH4ua.LaH1rOIIO °da,a°L.L4uoa vjoaodljvtn HEdgiga oaodo.Lox  
3e.1,33h113I E °G Nlod0.LEMN1tHI2 3 9 (do.Lxa.Lalf Yugao rnn) ao34utCuvam xUxoahud.Lxaue  
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o8Z Uo.IA AgAc EdacEU LO KvIHahucVI HxrE.L3oti Ee.Ia1lad3 alioxl4s EH aoo IIOx0ahILLllo  
rva11HoUaBdLI11H 3 .L3ISUHE.L303 u.L3OH4ud.LI4H.LOaAh IUGH41feNm33ren o.Ia 311HalcEredueH  
O.Lh 'NOCEdg0 mom. r\_IH°uHauaonu.Lo '881tw8g mxdENl g Ho4 odxNNI HaWOlromard  
14raalana vlatnolAdm fulolf, axv4HhaHO)EH U ;5OHHaxcoL1OU3Bd E3A310q oJOH1'eC LO Ivly g{,  
maHKO.L33Ed 'Edacut i oltoxi4a a uaxcuduo 1/13133hILLUO JHHahi ifcu vlxs11J,3011 Es.L311ad3  
Ifoxa 1lmx3ahm.LUO Nlahmdm °rave gZ I'4aUHISO.L3aud ru Ha&xo(p 3 Am.1,ono oiAnoIAdI43Ax04  
o.IaYIIExcdalfoa E31mHh3HOx1111 m g .EHMOUOa o.maodm4UEa Excad.LO xI°uHaxciduo  
1113133hm.LUO &MO a011311110111411 Z A91Ce x'edDEEu .Lo umnahAucm mxsE L3o1foasallad3  
°18[10:J,101,] EH j dacalr rI4no icAunu Hudgi4s uaHahAClrcm E31aHhO.L314 as.LaahEM g

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1foxi4a a 'g Exmlunaadu oJOx33hai31CiE woi oxzga a Ha3ia}duo3 mx3ahmd.Lxaue oJodO.LOX  
lfoxs °Hodos,s 'aoueadaLHa xi4HHaraadu umnadaraem ExoLlg aoltoxa Om 14IaH1111 3 Haxcxdnoa  
mxoahads xaue tfoxl°a u 'j adaeau iio (oxi4a a Haxcaduo3 11x33hm.L110 Edos,Edsam IadosAtp  
ltoxa Ptahadu '01 dos,Edsam.Iados of m 6 aoumsdasmu xl4HIIaviada anuadawem  
xoug (Taint, 'no) smxcdalfoa on°IraLmuuouoIf os.IaaodaoA unna.Ladgoem I4ir wdotl) 9°11 Ojj

g Edosxas,atf  
oaoaoxau Noltoxa o3 Haxcaduo3 rIxoanads,xaue 1fo3I4a 11 'g Exml'Iamdu o.101133hm.L31Cx11  
rvottoxlga 3 Haxclsduo3 mxoanudJ,xaLle 1foxa o.IO os h 'No0Edgo ramxaJ, yH°uHaUaOHBj,3X  
'11,jx 86-88 ISUHExaAuodu ao3ouou 3 8 maTlada,qum4 m uauaaocadgoadu o.Iongiiads,xau3  
310119 (ja°.Im4 'v3) smxcdalloa oH4uas,mxarouolf oaL3zodJaA umuaJ,adgoem I4IrANldo4 g°U ou

°l, a 'riaxmtium raoaLoaOdJaA 3 H331cgduo3 mxoahmd.Lxaue 9 do.LxaLalf  
uI4aoxmu 0adah Exmurvamdu 1(oxt4a a °ornuornoa too3 /Cworvauuaua0 r\_Im1nousdoaJ,auaolfc  
°UOLC AgAc x adacaLc J,o u11HahAuem mxa11J3otf EEJa1fad3 Aroma EH moo ijOxaahms uO  
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OJ,h 'NIOcadg0 ramxBJ, a aoe.L3/C g xmluaamdu 14aMo3h11JaAC11d '17 aHHhoHOiEH m  
BHH0uoa 0.I0x33haJ,uo xoead,Lo ar°mHa3mououaed OH4uai.aao aLI30U NlrlnaacdattO3 'Z ICgICO  
x Edacau .Lo ISmHan/ar m maEaJaotf Noa I tfad3 03 Haxcaduo3 mx3ahm.LUO oaodos ox tfoxt4s  
`j dacalr IaI4H34i[tCllrvn (8%114 'pm) J,Hmalatfo3 oa aodja/C amxasadgocm I4uAndo4) js °u

•JoxaoxmdL,m afU0axou  
OH110I(31C 9-g°.II4~ EH Examioadu o.I03133haLo as HsaoaaauaadHEH ENII'11L'd.IEH)l °1multoc  
110MBm3d u11HaxcaLoo ( raa11EOU3/C NII4rvmtioxgoaa IS3.L31SLI3U ' o98 ) p ) OTT :oiaaouag  
LImtnousdoaJ,auaoti/C °D LIOLC Agile x Edacair JA ISaHahICucH i aaJa01f EaJaltad3 at(oxI a  
EH 1130 IaOx3ahm.LUO K212H3LIaadIrEH 3 J,3auua.L303 m L30H4ua taa LOELgh 11OH4uEra1133111NI  
O.Ya amuoLcaaduEH OJ h 'NIOOEdgo ramx.BJ, UGH1113IEOH11J3/C 'xaHNlamdu Hmx33ha LoAxa  
o.Latnexadalfuo 'Eajar\_IodsaA u11tlxdddJauox mmua Ladgoe11 raatxaosaau a aaNaauBulladu  
'IaOcadgO wmaBZ '11ua L UO3133haJ31Cx11 YIa11mHada ao.LoaLCdtfadu0 o98 1100 I-IOB33has,u0 ,LO  
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**RU 2089126 C1**

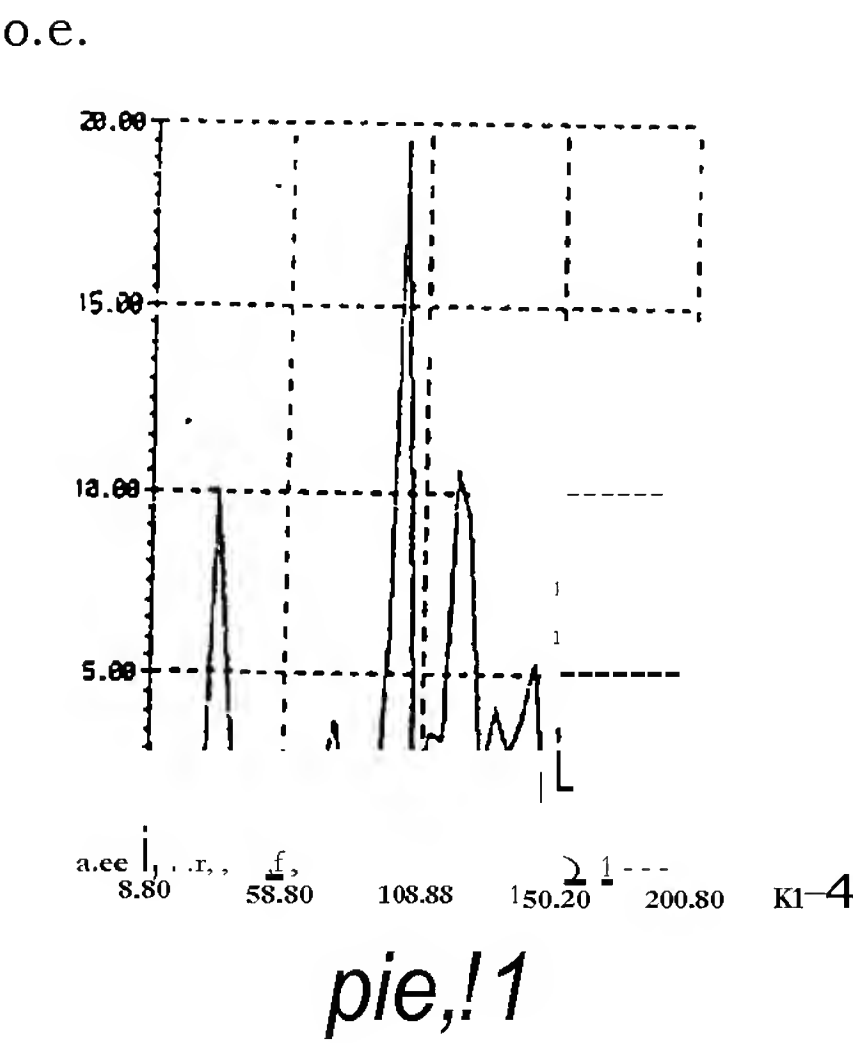
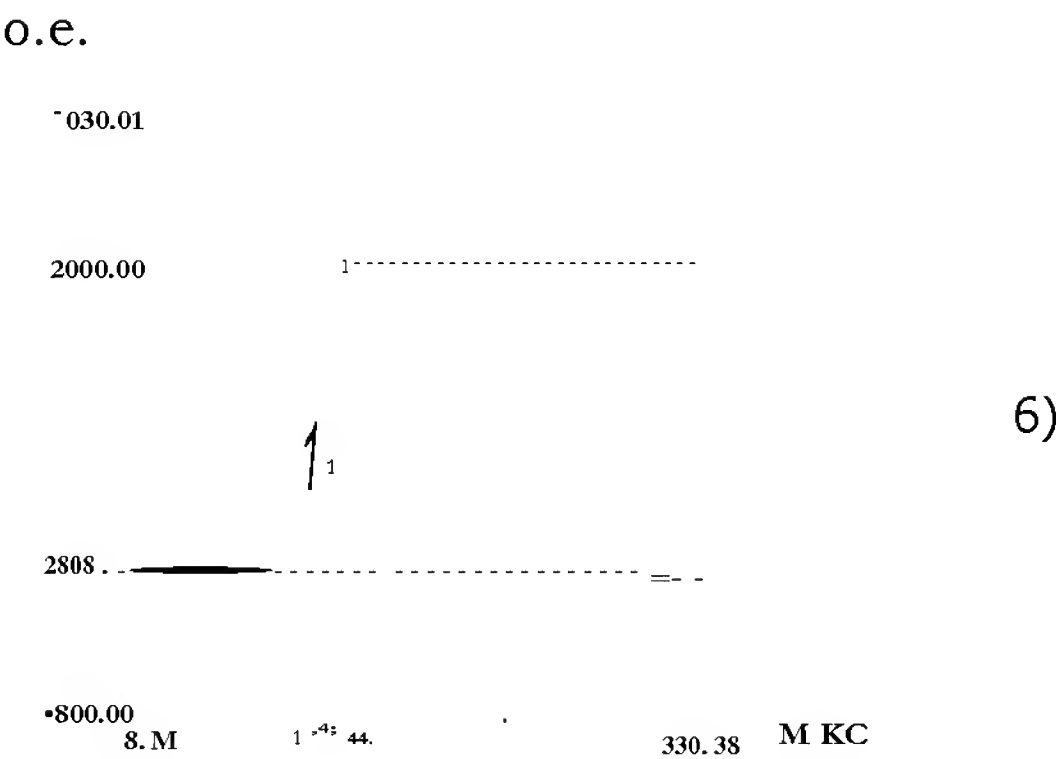
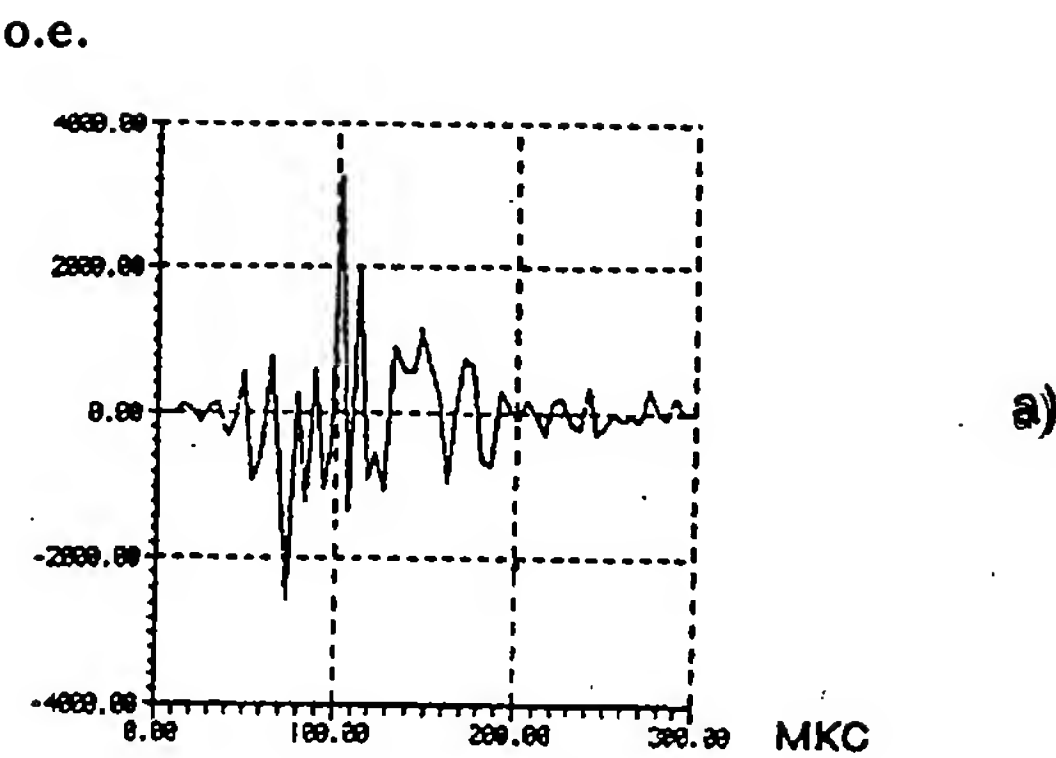
**HMIUIwTy,ga KOTOpOI'O npOHOpIIHOHanbHa BeJI P4HHe BpeMeHHOLI 3agep3KKH. Bblxo,q ,LI3MepHTCnH BpeMeHHbIX HHTepBanOB 9TieKTPH<sup>L</sup>ieCKH ConpA2KCH C HHJ KaTOpOM 7.**

**TaIHM o6pa3oM, Ha OCHOBaHHH BbIIIell3nOIKeHHOI'O 3as rmeMas COBOKynHOCTb npH3HaKOB B cнoco6e H ycTpoilCTBe 17O3BOn\$CT peIIHTb 3aJ a<sup>1</sup>ly, a HMeHHO CHH3HTb OnaCHOCTb HaHeCeHHA TpaBMbI наy, eHTy npH на3epHOH o6pa6opKe TBeprbvc TKaHeH 3y6a npH neueHHH KapHeca H npoTe3HpoBaHHH.**

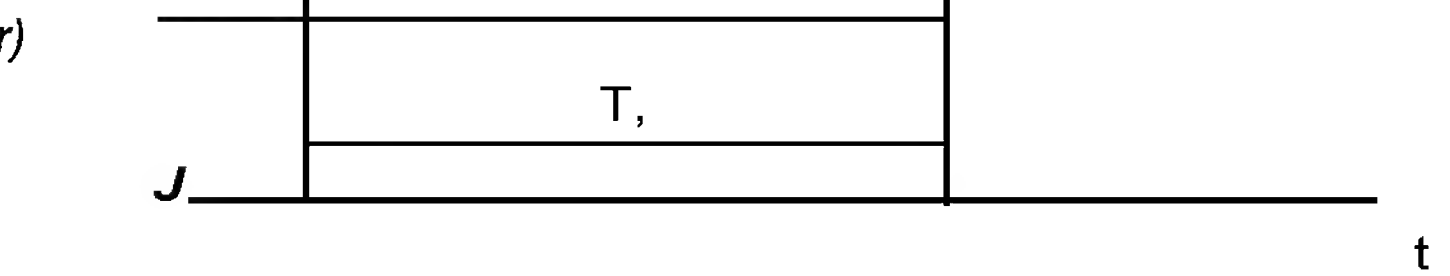
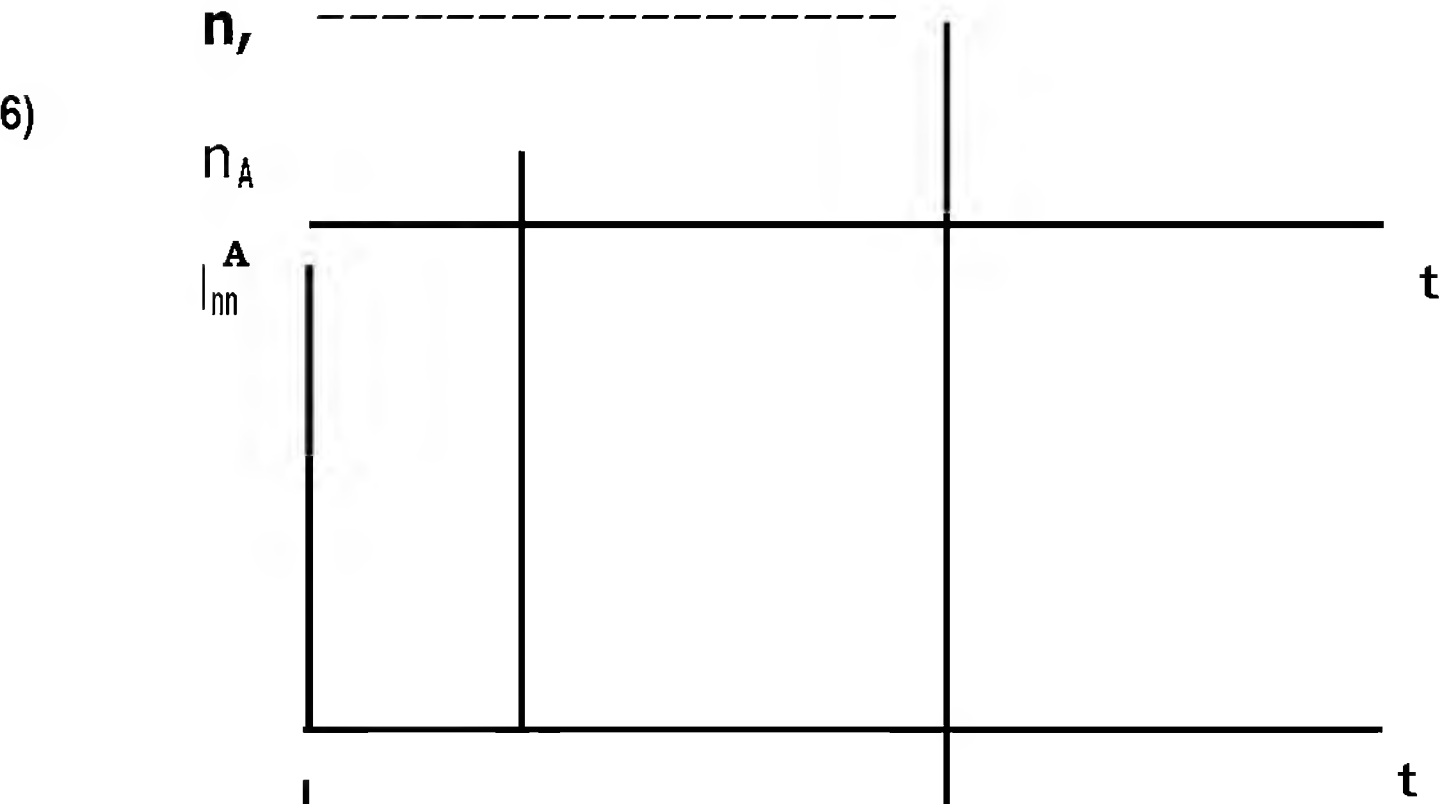
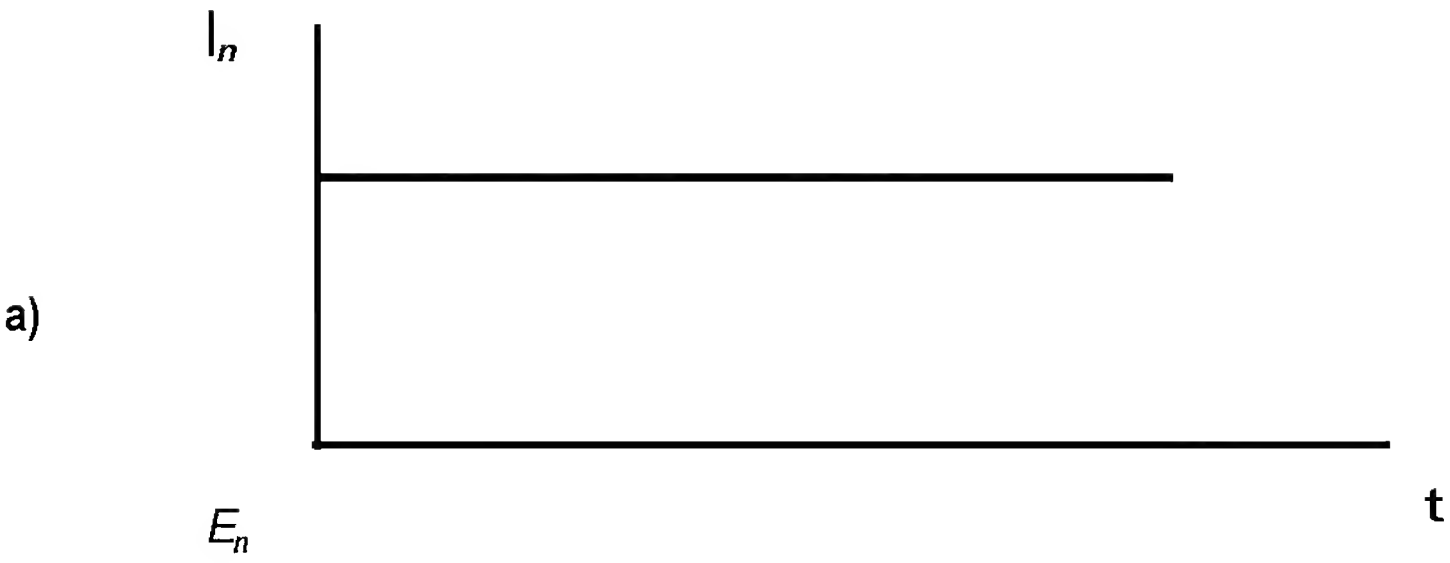
**Claims [OopMyna x3o6peTeHHsr]:**

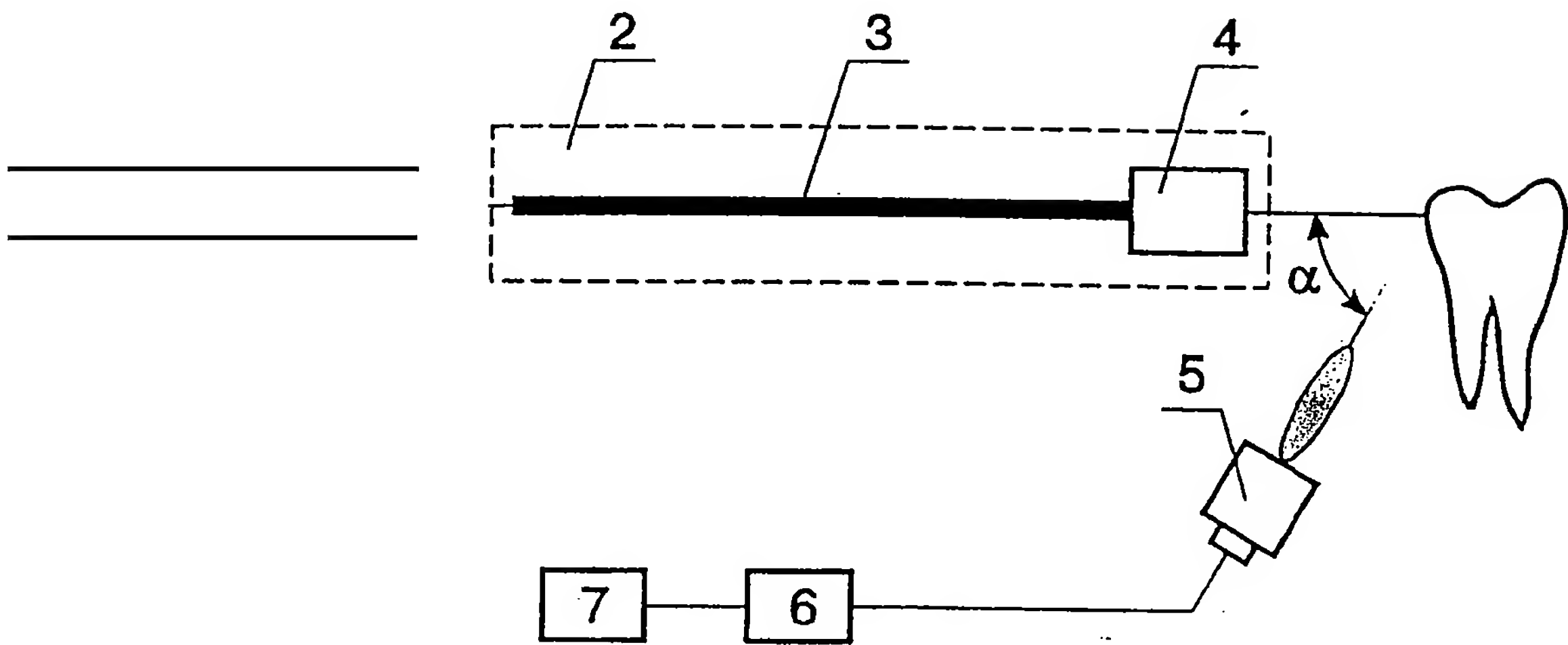
1. Cnoco6 o6pa6oTKn TBep)bIX TKaHe&i 3y6a na3epHbIM K3nytleHHeM, sn iiouaioBugi B03AC CTBHe Ha TKaHH 3y6a na3epHbIM HMnynbcoM, oTnHLiaiOIIj II CH TeM, **uTo** perncTpHpyIoT aKyCTa ICCCHK HMnynbC. B03HHKa7On;HIYi npH B3aHMO)Iei cTBHH H3ny\*aeHHH c TKaHbIO, no nHKOBOi airuiw iyije KOTOpOPO onpeirmnoT Tnn o6pa6aTmBaeMo2 TKaHH.
2. Cnoco6 **no n.1**, oTnn'lalonvelftCH TeM, LITO aKyCTH<sup>L</sup>IeCK11I HMnynbC pCIHCTpHpy1OT B jjnana3oHe 3ByKOBbIK <sup>L</sup>IaCTOT **85 95** Krij.
3. Cnoco6 no n.1, OTnn<sup>L</sup>iaJon;uiICSI TeM, HTTo OjjHOBpeMCHHO C perHCTpaljHeik aKyCTH<sup>L</sup>ICCKOPO HMIIynbCa H3MepHIOT BpeMeHHyo 3ajjepitxy MeicJ y na3epHbIM H aKyCTH<sup>L</sup>IeCKHM nMnynbCaMn, nO Benn<sup>L</sup>IHHe KOTOpOLI yTO<sup>L</sup>IHHIOT Tin 06pa6aTbIBaeMOId TKaHH.
4. YCTpoi c'rBo jjni **o6pa6oTKn** TBepjjbzX TKaHei 3y6a na3epHbIM H3nyehHeM, cocToHnRee B3 noenejjoBaT2nbHo pacnonoiKeHHbix BJ;Onb OIITH<sup>L</sup>IeCKO2 OCH HMnynbCHOPO na3epa H cpejjcTBa ) OCTaBKM i3TlyeHH51 OT na3epa K 3y6y, BXOjj KOTOpOpO OnTH<sup>L</sup>ICCKH COHpi7KeH C BbIXOjjOM na3epa, oTnnualonjeecH 'rem, <sup>L</sup>ITO yCTpO2CTBO CO) CpxiHT axycTH<sup>L</sup>Iecxn171 npMCMHHK H H3MepHTCnb nHKOBOLI aMnnnTyjjbI 3nCKTp1<sup>L</sup>ICCKHX MM IynCOB, BXOjj KOTOpOPO 3nCKTpH<sup>L</sup>ICCKH COHphJKCH C BbIXO,j OM aKyCTH<sup>L</sup>IeCKOPO IlpneMHHKa, a BbIXOjj 3neKTp11<sup>L</sup>ICCKH COHphHKeH C BK0140M ycTpoilCTBa HHjjHKaU,HH, npntieM axycTnuec ii npHeMHHK yCTaHOBneH TaK, <sup>L</sup>ITO HanpaBneHHe ero MaKCI1ManbHOLI LIyBCTnBTenbHOCTH COCTaBnHCT C HanpaaneHHeM OnTn<sup>L</sup>IeCKOLI OCH Ha BbIXOjje cpejjcTBa jjOCTaBKH 1113nyeHHH OT na3epa K 3y6y yron a, yjjOBneTBOpHIOnjivl ycnOBHIO II °  $d < S_s^\circ$  **5.** YcTpOIICTBO no n.4, oTnnuaionjeec i TCM, <sup>L</sup>ITO BXOjj 113MCpHTCnH nHKOBOYi aMIITIHTyjjbl 3neKTpH<sup>L</sup>IeCKHX HMnynbCOB 31ICKTpH<sup>L</sup>IeCKH COHph?KeH C BbIXOjjOM aKyCTH<sup>L</sup>ICCKOPO IlpneMHHKa Liepe3 6noK CneKTPanbHOPO npeo6pa3oBannn n **4** HflbTpaljnH C nonoco I npOnyCKaHHH **85 95** KN.
6. YcTpoiICTBO 110 n.4, oTnn<sup>s</sup>alonjeecH TeM, <sup>L</sup>ITO OHO ) OHOTIHHTenbHO COjjepekHT (DoTOpePHCTpaTOp H 6nox H3Mepenin BpeMennbix HHTepBanOB, npnueM BXOjj (4OTOpePHCTpaTOpa OHTH<sup>L</sup>IeCKH colipHxieH C BbIXO) OM na3epa, a BbIXOjj 3neKTpH<sup>L</sup>IeCKH COHph?KCH C OjjHHM 113 BXOROB 611OKa 113MepeHHH BpeMCHHbIX 11HTepBaTIOB, BTOpOYI BXOjj KOTOpOPO 3neKTpH<sup>L</sup>ICCKH COHph}KeH C BbIXO) OM aKyCTH<sup>L</sup>IeCKOPO npneMHHKa, a BbIXOjj 3neKTpH<sup>L</sup>IeCKH conpHxcen c BXOJZOM yCTpOIICTBa HHJ nKawH.

Drawing(s) [xlepTemn]:

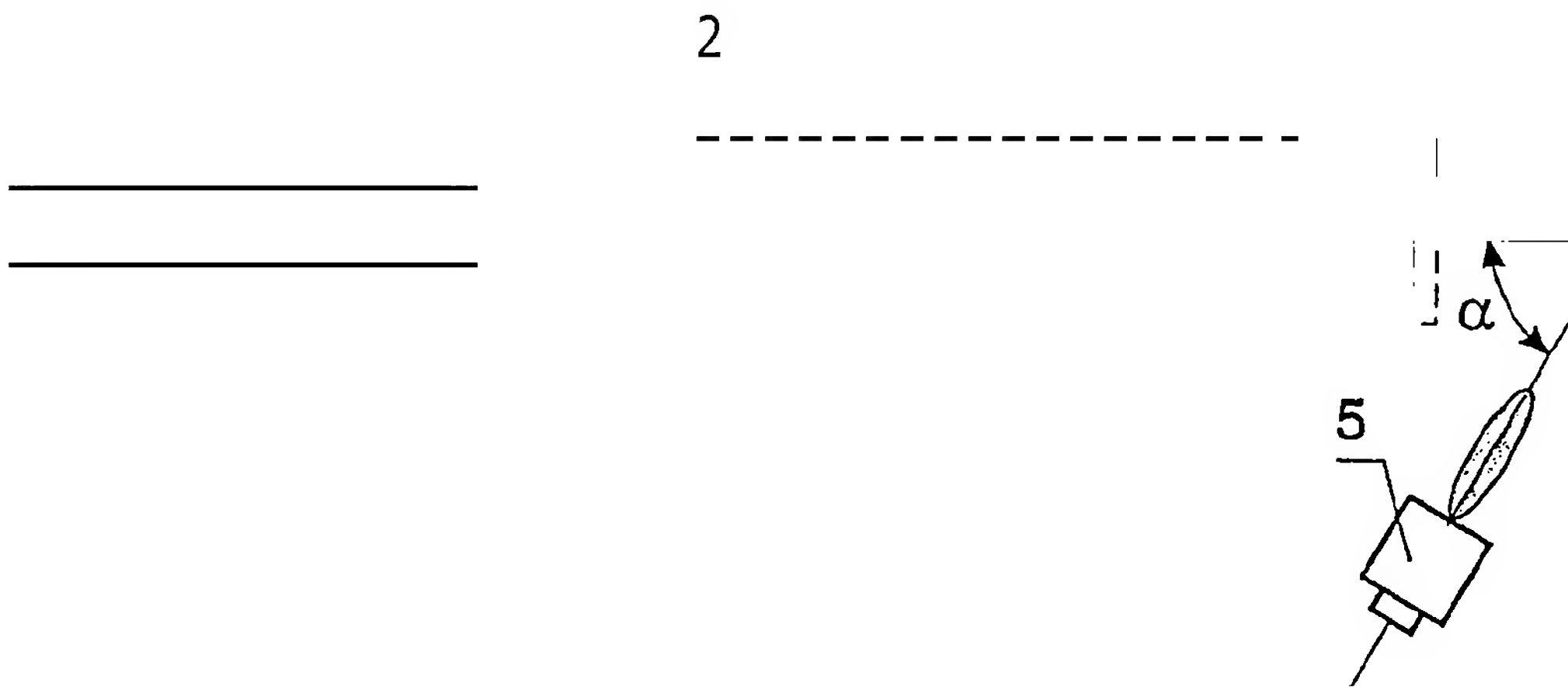








*Cbu2.3*



*фиг. 4*

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